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Image Processing Based Application to Control PowerPoint Presentation

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Abstract:

The proposed system is developed using static hand gesture recognition in real-time that facilitates effective andeffortless human-computer interaction. This system makes possible the control of Power Point presentation throughdistance. It is not necessary for the user to control the PowerPoint presentation through keyboard or mouse or laser pointer.This system does not makes use of traditional methods for hand gesture recognition such as by using hand-gloves , markers ,rings, pens or any other devices. The proposed system takes theinput data from the portable webcam consisting of four handgestures. The image captured from the input data is then processed and then using background subtraction the gesture information is extracted from it. The processed image is then compared with the database of the predefined gesture images. The recognized image isthen used to control the Slide-Show Presentation.

Keywords **— Hand gesture recognition, Human-Computer Interaction, Power-point presentation, Image subtraction algorithm, Color Features.**

I. INTRODUCTION

In today's world, gesture recognition assumes a crucial part for connection amongst Humans and Computers. Gesture recognition facilitates user-friendly communication between humans and computers and enables the human beings to interact without any mechanical devices such as keyboards, laser pens and many more other devices. In the proposed algorithm, clients can utilize basic gestures to control the SLIDESHOW Presentation without physically touching the PC. The image gesture thus acquired consists of different background elements with varying surrounding lights. So, the acquired image is subjected to segmentation. The segmented image is processed further in order to make it fit for comparison with the gesture images stored in database. Depending on the operation defined for the gesture the database will provide this information to the system and the system will carry out the specified operation.

II. RELATED WORK

Numerous applications have been produced that are controlled through gestures that includes gaming, sign language recognition, control through facial gestures, controlling mouse, VLC media player etc.

In 2012 a system was developed that recognized seven hand gestures like up, down, right, left, cross and circle. Three different modules were built that recognized hand gesture. Signals from MEMS 3-axes accelerometers were given as input. The motion of the hand in three perpendicular direction is detected by 3 accelerometers and transmitted to the system through Bluetooth. Segmentation algorithm was applied and finally the gestures are recognized by comparing gestures that are already stored in the system [1].One of the methods of hand gesture detection is by calculating the centroid of the object region with the help ofDistance transform method and then determine the finger count. Some also make use of Circular Profiling for determining the finger count [2].Some systems use directional search algorithm for the identification of the entire

hand contour. Then k-curvature algorithm is used to locate the finger tips over the contour for recognizing the gestures and dynamic time warping is used to select gesture candidates [3]. Some systems have used the technique of camshaft for tracking hands and its gestures and classifier is implemented with the help of HAAR Technique [4].DSP processor and monochrome glove have also been used in some systems for classification of hand gestures [5][7]. Digital Pen consisting of microcontroller etc. has also been used in Hand gesture recognition [6]. One of the systems has used specialized gloves having 10 sensors for hand body language recognition and three machine learning algorithms were developed with the help of following classifiers: probabilistic neural network, support vector machine and k- nearest neighbour algorithm [8]. Some of the systems have also started working on emotion recognition. One of them uses three peak frame selection approaches; they are Maxdist, Dend Cluster, and Eifs [9]. One of the systems has used selective temporal filtering for gesture recognition. Unlike temporal data analysis, selective temporal filtering helps to build a noise free model for classification [10].

III. METHODOLOGY

The System design is as appeared inFig (1), it consists of image acquisition, segmentation of hand region, finger count recognition and motion recognition and finally slide show control.

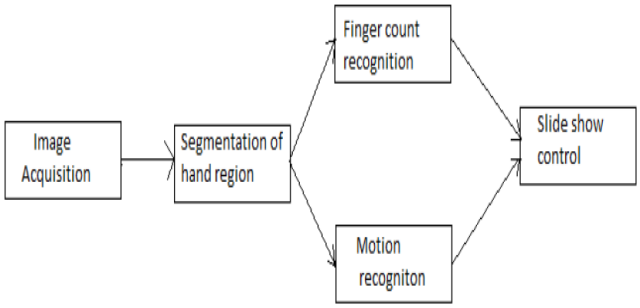

Fig. 1 System Architecture

Image Acquisition

The client makes motions by situating hand parallel to webcam. Pictures are ceaselessly caught and afterward given as Input for segmentation.

Feature Extraction

The primary step in gesture recognition systems is the detection of hands and the segmentation of the relating picture locales. This segmentation is essential since it disconnects the assignment applicable information from the picture foundation, before passing them to the subsequent tracking and recognition stages. An extensive number of strategies have been proposed in the literature that use a few kinds of visual highlights and, by large, their mix. Such highlights are skin features, shape, movement and anatomical models of hands.

Segmentation of Hand Region

The images captured are given for analysis which is done using segmentation. Here skin detection algorithm is used that detects the skin region from the input image as the background may consist of many other things along with the hand region. The video obtained through a webcam is in the RGB colour model.This video is converted to HSV colour model because the regions which belong to the skin can be easily identified in HSV model. Following this, the rules for skin segmentation are applied. After recognizing hand it is converted into a binary image. The skin regions are represented using white colour and all other non-skin regions are black. The largest connected region, which is detected as skin is taken as the hand region. This gives the segmented hand region and this is the region of interest. The recognition of the gestures depends on this region.

Finger Count Recognition

Once the hand region is identified the next step is to count the no of fingers. The number of fingers is counted by counting the no of blobs present in the image. The number of fingers can vary from 1 to 4. Each count has been assigned a specific task with respect to controlling the operation of the slideshow.

Whenever the number of fingers are counted the system checks in the database that what are the operations assigned to that count. Once the operational data is retrieved from the database this

control information is passed on to the next stage which carries out the actual execution.

Motion Recognition

After segmentation the binary image is given to the distance transform method that recognizes the gesture. In this method firstly the centroid of palm is calculated by considering each pixel and calculating distance from nearest boundary. Therefore the pixel that is far from every boundary is chosen as centroid. Using this centroid active fingers are counted and if there is motion of hand, this is detected by motion of centroid from original position from a set of continuously captured images and the slide show is controlled that is PowerPoint presentation either goes to the next slide, previous slide or start after recognizing static gesture.

Once the hand region is identified the next step is to count the no of fingers. The number of fingers is counted by counting the no of blobs present in the image. The number of fingers can vary from 1 to 4. Each count has been assigned a specific task with respect to controlling the operation of the slideshow.

IV. PROPOSED ALGORITHM

1. For the given binary image Check for all the pixels that are on boundary and assign it some value.
2. For each pixel in image an image other than boundary imageCalculate distance of that pixel from every pixel on boundary.
3. Assign some value for the pixel whose distance from every boundary pixel is maximum.
4. This pixel is the centroid of the image. Using this centroid slide show is controlled.

V. IMPLEMENTATION

The system was implemented using Matlab r2015b Software. POWER POINT Application is opened through the Mat lab. For this purpose Mat lab has initially taken permission from Windows Server. The features of the database consisting of four gestures were initially extracted and stored in a particular.MAT File. Each one of the four gestures is used to control the slides in PowerPoint presentation through distance.

The execution was performed with about 3 people under different background illuminating conditions such as incandescent lamp, sunlight etc. Care was taken that there is no background element of color which is same as skin color like furniture etc.Out of four gestures, gesture one finger is 100% recognized. The other three gestures are not 100% recognized. This decrease in accuracy percentage is due to various reasons.

One of the reasons is lack of presence of proper brightness in the background and presence of skin colored objects in the background. The other reason is that some gestures were not taken in the closed focus of the camera. Gestures were properly recognized in daylight.

VI. CONCLUSION

The introduced gesture recognition system perceives both static and dynamic gestures. Signals are perceived utilizing distance transform technique alongside skin colour segmentation algorithm. The displayed technique does not require any preparation stage to distinguish the hand motions. Subsequently does not require training of pictures in database to perceive the hand motions. A suggested future work would incorporate, expanding the quantity of signals alongside speech recognition that make it intriguing and simple to navigate PowerPoint which will incorporate making slides, adding contents and so forth. Besides motions can be utilized to control different applications like adobe reader, paint and include promote by controlling PC utilizing gestures.

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